

PATENT SPECIFICATION

747,338



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COMPLETE SPECIFICATION

Improvements in a Machine Turntable and Shiftable in all Directions on the Ground, particularly for Driving Piles and the like

We, COMPAGNIE INTERNATIONALE DES PIEUX ARMES FRANKIGNOUL, SOCIETE ANONYME, a Limited Liability Company organised under the laws of Belgium, of 196, 5 rue Gretry, Liege, Belgium, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a machine which is capable of being turned and shifted in all directions on the ground and which is particularly adapted for driving and/or withdrawing piles, tubes or the like. In its broadest aspect, the invention applies to any heavy machine capable of moving directly on the ground by its own means, in every direction. More specially, the invention has for 10 its object to provide a machine of the type specified, wherein all movements may be effected in a simple and swift manner, while securing perfect stability of the machine in every position thereof.

Machines are known which are provided with one or more jacks by means of which the platform of the machine, on which the various components of the latter are mounted, may be lifted, with the result that the means 15 by which the machine is supported on the ground and which are secured to the said platform, are cleared from the ground and that the platform comes to rest upon a circular rolling track supported by the jack or jacks, so that the angular position of the machine may be modified by imparting to the platform the required angular displacement along the said rolling track. Such known machines include special means for 20 causing the rectilinear, translatory motion of the machine when the latter rests on the soil through the medium of its supporting means, while the said jacks, which are suspended from the machine, are cleared from the ground.

According to this invention, the machine is provided with three lifting jacks distributed over points of the platform which form the apices of a triangle enclosing the center of gravity of the machine, each of the said jacks being provided at the end of its lower member with a foot-plate through which the jack has a bearing on the ground and being suspended through the medium of its upper member from a turret which is united to the platform so as to be able to rotate about a vertical axis, the arrangement being such that one portion of the turret, having a horizontal upper surface, lays under a corresponding horizontal surface of the platform, the said upper member of the jack being suspended from the said turret through the medium of a mechanical connection adapted to allow for a determined rectilinear horizontal relative movement between the jack and the said turret, a limited transverse play being provided for between the turret and the jack, means being provided for effecting an angular displacement of the turret with respect to the platform when the said plate is cleared from the ground, means being further provided to effect a relative, horizontal movement between the turret and the jack in every position of the said plate.

According to a preferred embodiment of the invention, the turret is suspended through the medium of a flange integral therewith and acting as a circular rolling path, on rollers carried by the platform, the rotation of the turret being effected through a toothed rim rigid with the turret and driven from a gear mechanism mounted on the platform.

According to the invention, the mechanical connection between the turret and the lifting jack preferably comprises a carriage secured to the upper member of the said jack and provided with two rows of rollers cooperating with two pairs of vertically spaced rolling track members which are integral with the turret, the said track members allowing for a

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limited transverse play of the carriage with respect thereto, the vertical spacing of the two track members of each pair being slightly larger than the diameter of the rollers. The 5 relative horizontal displacement between the jack and the turret is preferably produced by a shifting jack one member of which is secured to the turret, while the other member thereof is coupled to the carriage of the corresponding lifting jack.

With the above described construction it becomes possible to effect the various displacements of the machine simply and rapidly. To produce the translation of the 10 machine, all that need be done is to position the three turrets angularly, so that their rolling paths be parallel to the intended direction of displacement of the machine, to raise the latter by means of the three lifting jacks and to shift it by means of the shifting jacks. When it is desired to vary the angular position of the machine, all that need be done is to position two of the turrets angularly, so that their rolling tracks be substantially 15 tangent to corresponding circles, the centre of which is located on the axis of the third jack, to raise the machine by means of its three lifting jacks and to cause the machine to swivel about the said third jack, by operating the shifting jacks corresponding to the two other lifting jacks.

Further features and advantages of the invention will appear from the disclosure of one example of carrying out the invention, 20 as will be given hereinafter with reference to the accompanying diagrammatical drawings, in which the various components which are not essential for the understanding of the invention have been omitted.

Figure 1 is a side view of the lower section of a machine specially designed for driving and/or withdrawing piles, tubes and the like.

Figure 2 is a plan view of the said lower section of the machine, the components supported upon the platform of the machine 25 being omitted.

Figure 3 is an end view of the machine. Figures 4 and 5 are plan views illustrating two ways of shifting the machine angularly.

Figure 6 is a view drawn to a larger scale, partly in vertical section of a directing turret, with the corresponding lifting jack; and

Figure 7 is a sectional view according to line VII-VII of Fig. 6.

The machine includes a platform 1 which is substantially formed by an assembly of longitudinal and cross girders and supports the runner adapted to guide a pile or a tube 2 to be driven into or pulled out from the ground. The platform further carries the engine, the winch, the pump and other units required for the various steps to be performed. When such steps are being carried out, the machine bears on the ground through the medium of supporting means which are

properly dimensioned and positioned so as to secure the required stability of the machine, such supporting means comprising e.g. assemblies of girders 3 and 4 arranged at the front and at the rear. The supporting assembly 3 is made with a recess where a pile or a tube will be located. The supporting assemblies are connected to the platform by suspension springs, not shown, and their position with respect to the platform may be adjusted by means of screw jacks 5 acting as adjustable abutments.

At the ends of the cross girders of the platform and adjacent the ends of the longitudinal girders of the latter there are arranged three lifting jacks 6, 7, 8, said jacks being each suspended from a turret mounted for rotation about a vertical axis in the platform 1, the arrangement being such that each jack is capable of performing a limited horizontal movement with respect to the corresponding turret. A connection of this type is shown more specially in Figures 6 and 7. The connection includes a turret 9 which is rotatably mounted in a guide member 10, rigid with the platform 1; the said turret being suspended on rollers 12, through the medium of a flange 11 integral with the turret and acting as a rolling path at the top portion of the turret, the said rollers, which are e.g. four in number, being mounted on the platform. A toothed rim is rigid with the turret and is driven by a pinion 14 pertaining to a gear mechanism mounted on the platform. The turret 9 is rigid with a structure including a horizontal web 15 extending laterally under a horizontal web of the platform 1; and two parallel frames each formed of two vertically spaced track members 16, 17. As a result, the whole assembly 15, 16, 17 rotates in one with the turret 9. The lifting jack 6 (7 or 8) corresponding to each turret, and which will generally be a hydraulic jack, includes a lower member the end which is secured to a plate 18 by means of a ball-and-socket joint 19, whereby the plate may adjust itself correctly on the surface of the ground. The upper member of the jack is rigidly secured to a carriage provided with four rollers 20 arranged between the track members 16 and 17, the diameter of the said rollers being slightly smaller than the vertical spacing of the track members. The mutual guiding action of the track members and the rollers is such as to allow for a slight relative transverse movement therebetween. The carriage is coupled, e.g. by means of a pivoted connection, to one member of a shifting jack 21, such as a hydraulically or pneumatically operated jack, the other member of the jack being secured, for instance by means of a pivotal connection, to a bracket 22, integral with the turret structure 9, 15, 16, 17. Both the jacks 21 and 6, 7, 8 are of the double acting type. The piping for the driving fluid has not been

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shown in the drawings.

It will be seen that, when the plates 18 are cleared from the ground, in which case the machine will rest upon its supporting members 3, 4, then each turret will bear through the medium of the rim 11, upon the rollers 12, while the whole of the jack 6 (7 or 8) and the plate 18 is suspended on the tracks 17 through the medium of the rollers

5 10 15 20 25 30 35 40 45 50 55 60 65

Inversely, when the machine is lifted by the jacks 6, 7, 8, in which case the latter bear upon the plates 18, while the supporting members 3, 4 are cleared from the ground, then the turret will bear upon the rollers 20 through the medium of the track members 16, the said turret then supporting the platform 1 by means of the webs 15. It will be understood that the position shown in Figure 1 will only be assumed momentarily since the plates 18 and the supporting members 3, 4 are lifted each in turn.

When a pile or a tube 2, for instance, is being driven or pulled out, the machine will bear upon its supporting members 3, 4. When it is required to shift the machine to a place where a further pile or tube is to be driven or pulled out, all the necessary steps may be performed readily and quickly.

Indeed, when it is required to shift the machine in a straight line, all the turrets are so directed that all the track members 16, 17 are parallel to the desired direction. Locking means of any type may be provided for locking the turrets momentarily in the desired position. The plates 18 are lowered on the ground and the machine is raised by means of the jacks 6, 7, 8. When the shifting jacks 21 are now operated the machine will be shifted in a straight line, the magnitude of such displacement being limited by the track members 16, 17. The machine is then lowered to the ground, the plates are lifted, the carriages are brought to the opposite ends of the track members 16, 17 by the jacks 21 and the machine is lifted again so that it will be possible to perform another shift in a straight line, as above described.

When it is desired to modify the angular position of the machine, the latter may be caused to swivel about any one of its lifting jacks, two possible ways being shown in figures 4 and 5. When plates 18 are in the lifted position, two of the turrets are caused to swivel until the track members 16, 17 of each turret are substantially perpendicular to the line joining the axis of the third lifting jack to the axis of the respective turret. The plates 18 are then lowered and the machine is raised by means of the lifting jacks. All that need be done then is to operate the shifting jacks 21 of the two respective turrets, with the result that the machine will be caused to swivel about the axis of the shifting jack of the third turret, as indicated by the arrows in figures

4 and 5. While this movement is being performed, the track members 16, 17 of the said two turrets are rolling upon the rollers of the carriages which are integral with the lifting jacks and, in so doing, the said track members describe a small arc. Considering that the magnitude of relative displacement of the track members and of the carriages is small with respect to the radius of the arc, i.e. the distance between the said track members and the center of the jack which has been selected as rotational center, the said arc and the tangent thereto nearly merge into each other. Therefore, only a small transverse play of the carriages with respect to the guiding track members is required.

It will be understood that the invention is not limited to the example disclosed and illustrated, since several constructional changes may be made therein without departing from the spirit of the invention.

What we claim is:—

1. A machine capable of being turned and shifted in all directions on the ground, particularly adapted for driving and/or for withdrawing piles, tubes and the like, including a platform provided with supporting members secured thereto, three lifting jacks distributed at spaced points of the platform, each of the said jacks being provided at the end of its lowermost member with a foot-plate adapted to bear on the ground and being suspended through the medium of its upper member to a turret which is united to the platform so as to be able to rotate about a vertical axis, the arrangement being such that one portion of the turret, comprising a horizontal upper web, lays under a corresponding horizontal web of the platform, the said upper member of the jack being suspended from the said turret through a mechanical connection adapted to allow for a predetermined rectilinear horizontal relative movement between the jack and the said turret, a limited transverse play being provided for between the said turret and the said jack, means being provided for effecting an angular displacement of the turret with respect to the platform when the said plate is cleared from the ground, and means being further provided to effect a relative horizontal displacement between the turret and the jack in every position of the said plate.

2. A machine as claimed in claim 1, in which the turret is provided with a flange forming a circular rolling path through the medium of which the turret is suspended on rollers carried by the platform.

3. A machine as claimed in claim 1 or 2, in which the turret is integral with a toothed rim in mesh with a pinion carried by the platform and driven from a gear mechanism mounted on the latter.

4. A machine as claimed in claim 1, 2 or 3, in which the mechanical connection be-

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5 between each turret and the corresponding lifting jack comprises a carriage secured to the upper member of the said jack and provided with two rows of rollers cooperating with two pairs of rolling track members integral with the turret, the members of each pair being spaced vertically from each other by a distance which is slightly larger than the diameter of the said rollers, the latter being guided with a slight transverse play between such track members, while the said carriage is coupled to a member of a substantially

horizontal shifting jack, the other member of which is secured to the turret.

15 5. A machine capable of being turned and shifted, in all directions on the ground, particularly adapted for driving and/or for withdrawing piles, tubes and the like, substantially as hereinbefore described with reference to the accompanying drawings.

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MEWBURN, ELLIS & CO.,
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Fig.1.

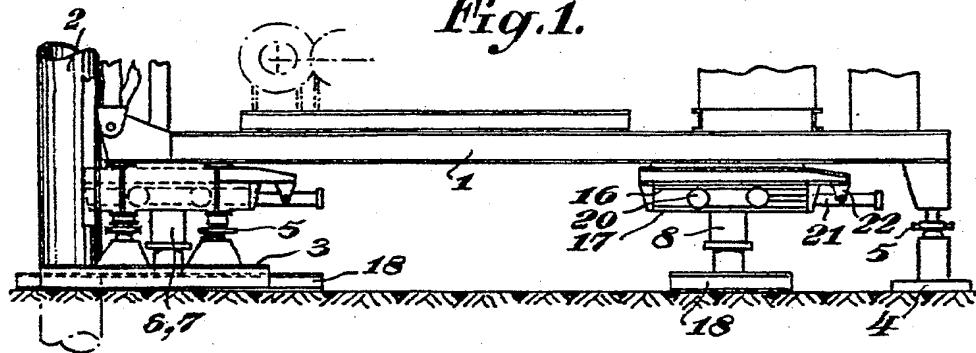
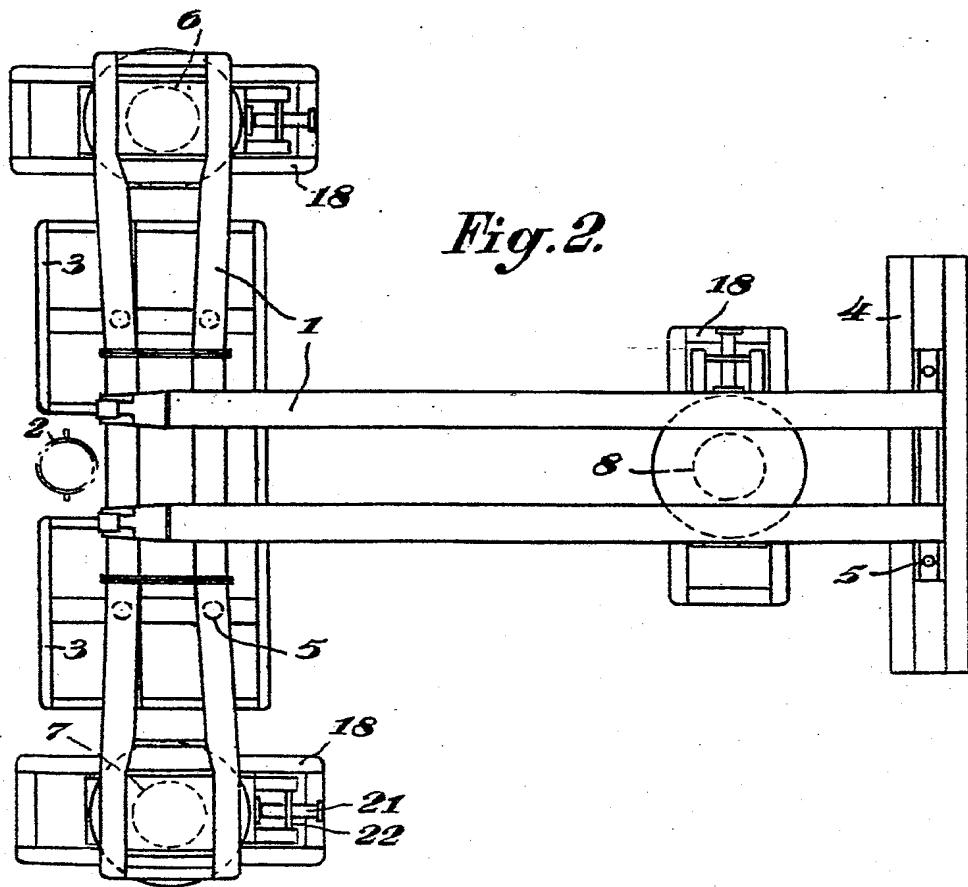


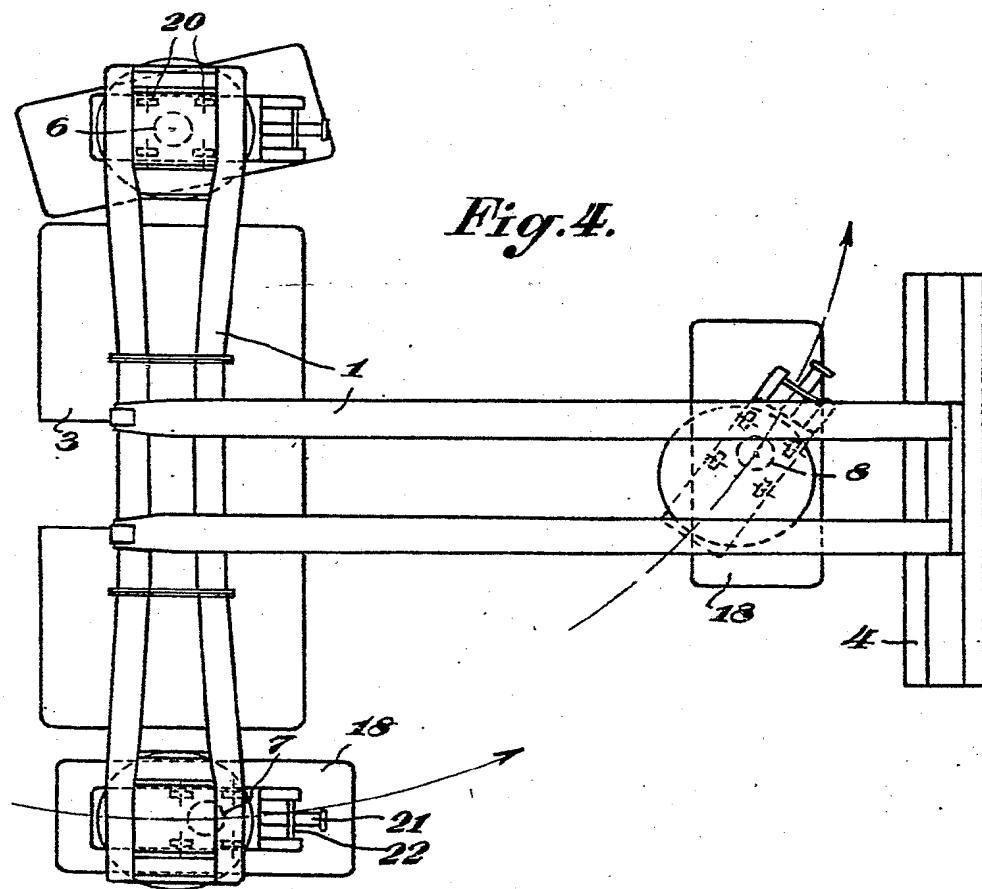
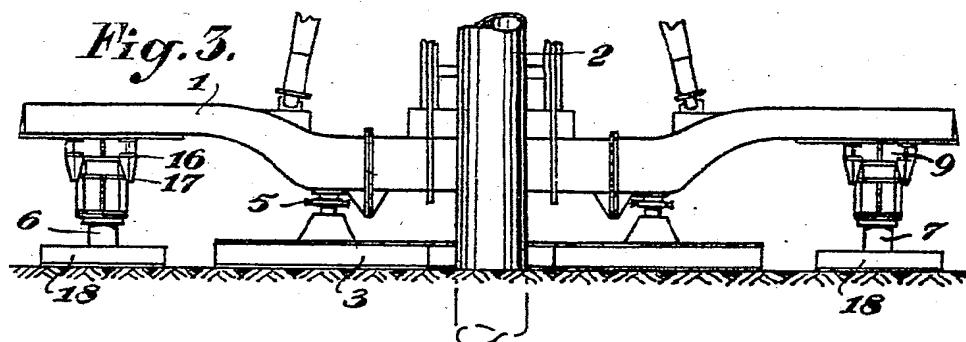
Fig. 2.



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4 SHEETS

This drawing is a reproduction of
the Original on a reduced scale.
SHEETS 1 & 2



747,338 COMPLETE SPECIFICATION
4 SHEETS This drawing is a reproduction of
the Original on a reduced scale.
SHEETS 1 & 2

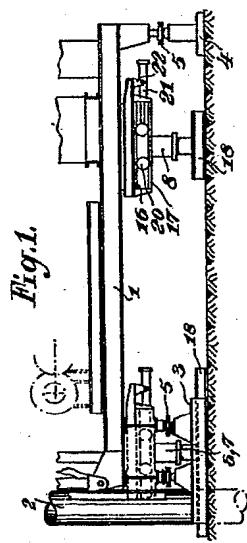


Fig. 1.

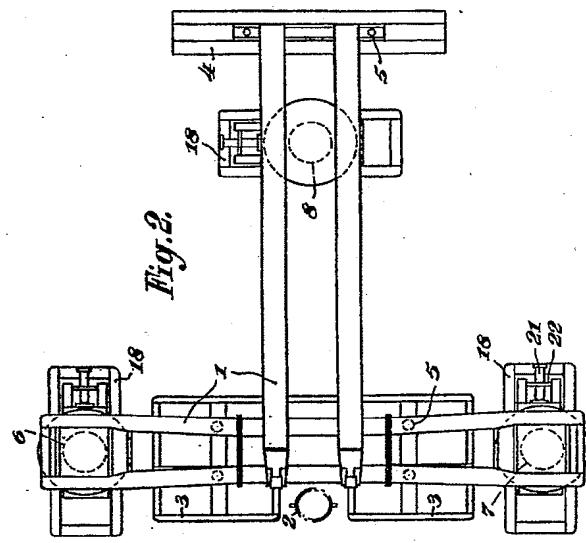


Fig. 2

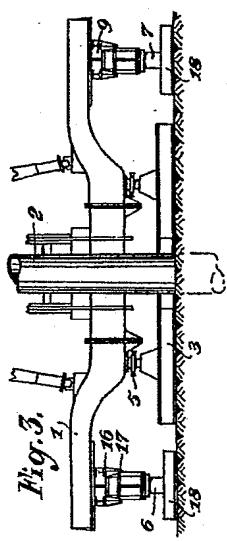


Fig. 3.

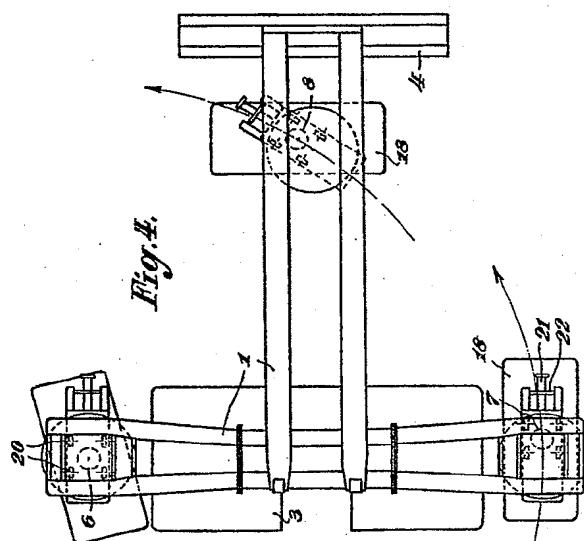
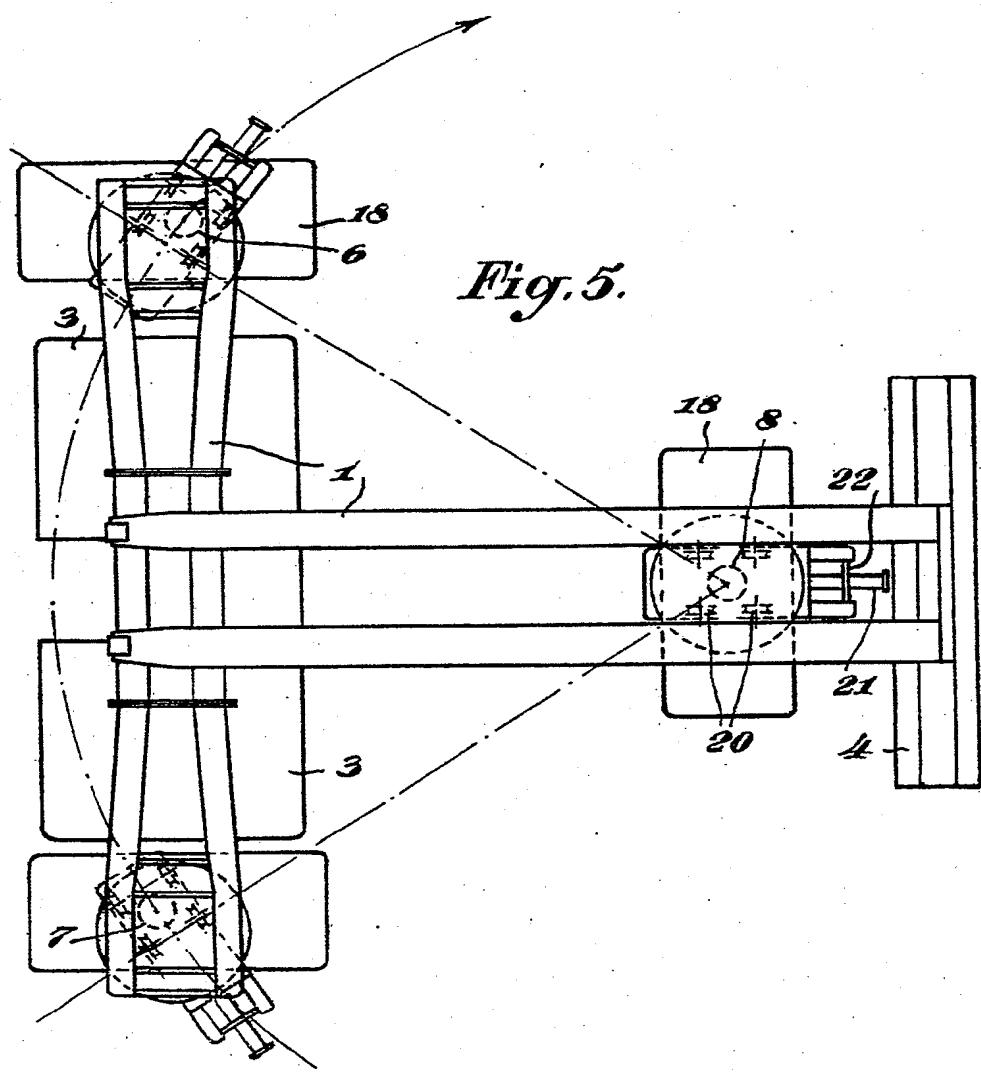


Fig. 4.

Fig. 5.



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4 SHEETS

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the Original on a reduced scale.

SHEETS 3 & 4

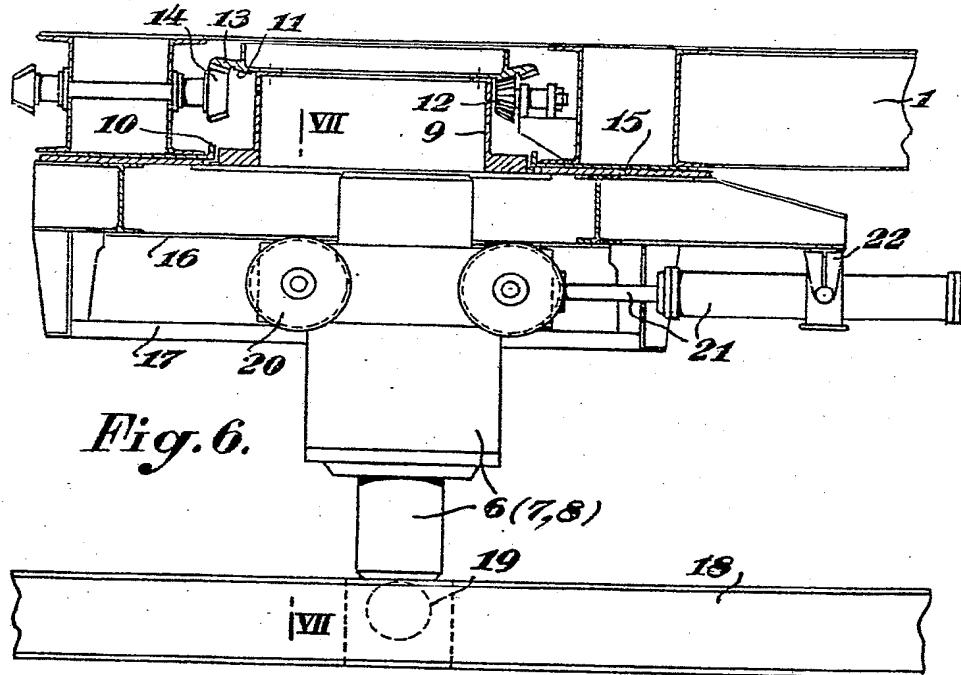


Fig. 6.

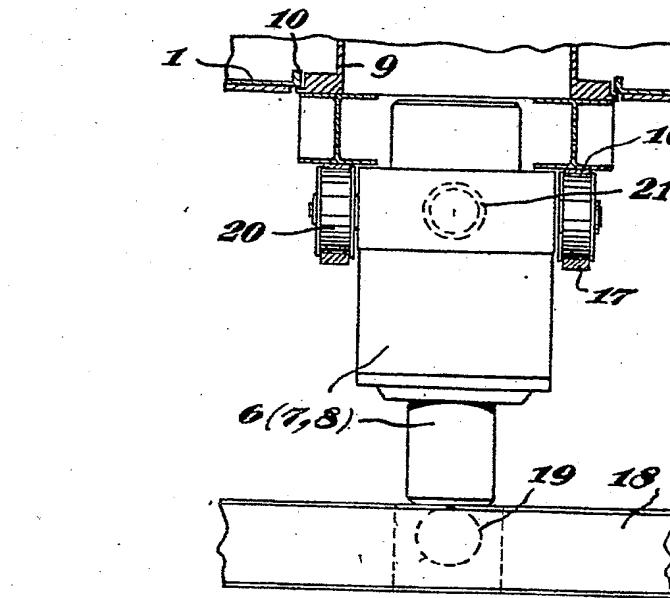


Fig. 7.

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4 SHEETS This drawing is a reproduction of
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SHEETS 3 & 4

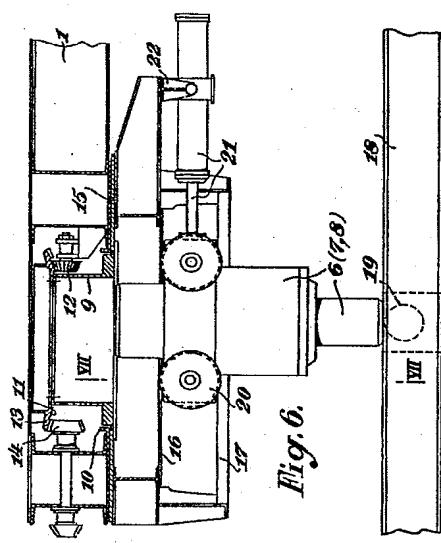


Fig. 6.

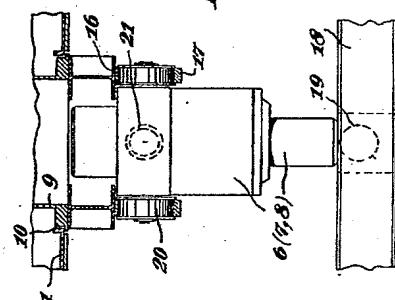


Fig. 7.

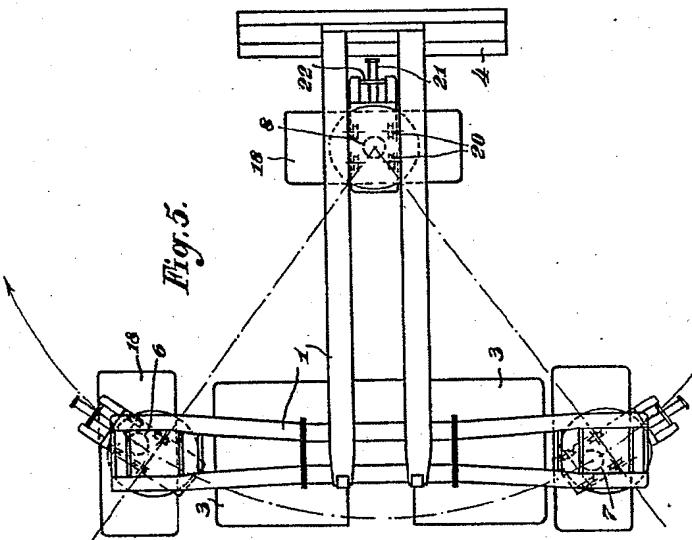


Fig. 5.